

## Yablonskiy NIH BIO

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NAME Dmitriy A. Yablonskiy, PhD		Professor, Department of Radiology	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Kharkov State University (Ukraine)	MS	1970	Physics (with honors)
Institute for Physics and Engineering of the Ukrainian Academy of Sciences	PhD	1973	Physics and Mathematics

### A. Personal Statement

I am an MRI physicist with 20 years of experience in developing theoretical biophysical models of biological tissue structure and functioning. We use these models for designing new MRI techniques and applying them to study structure and functioning of different human organs in health and in disease. I have authored and co-authored about 200 papers in peer-review journals in the areas of MRI, physiology, and theoretical physics.

My lab has developed several advanced quantitative MRI-based methods for *in vivo* studying of humans and animals, which include the *in vivo* lung morphometry with hyperpolarized <sup>3</sup>He MRI, the Gradient Echo Plural Contrast Imaging (GEPCI), and the quantitative BOLD (qBOLD). These, and other methods developed in my lab allow early detection and diagnosis of changes in lung microstructure in health and diseases, quantification of tissue damage in multiple sclerosis, Alzheimer and other CNS diseases, thus providing safe and non-invasive *in vivo* biomarkers for monitoring disease progression. This opens a door to improving longitudinal studies in clinical and research trials.

### B. Positions and Honors

#### Positions:

1970-1974	Junior Research Fellow at the Institute for Physics and Engineering of the Ukrainian Academy of Sciences (Kharkov, Ukraine). Division of Theoretical Physics.
1974-1976	Junior Research Fellow at the Institute for Physics and Engineering of the Ukrainian Academy of Sciences (Donetsk, Ukraine). Theoretical Division of Magnetism and Superconductivity.
1976-1982	Senior Research Fellow at the Institute for Physics and Engineering of the Ukrainian Academy of Sciences (Donetsk, Ukraine). Theoretical Division of Magnetism and Superconductivity.
1982-1989	Professor of Physics, Donetsk State University (Donetsk, Ukraine) Professor of Physics, Kharkov State University (Kharkov, Ukraine)
1982-1983	Acting Head of Division at the Institute for Physics and Engineering of the Ukrainian Academy of Sciences (Donetsk, Ukraine). Theoretical Division of Magnetism and Superconductivity.
1983-1989	Head of Division at the Institute for Physics and Engineering of the Ukrainian Academy of Sciences (Donetsk, Ukraine). Theoretical Division of Magnetism and Superconductivity.
1989-1991	Principal Research Fellow at the Institute for Low Temperature Physics and Engineering of the Ukrainian Academy of Sciences (Kharkov, Ukraine). Division of Mathematical Physics.
1992-1993	Research Associate at Case Western Reserve University (Cleveland, OH). Department of Radiology.
1993-1996	Research Associate in Radiology, Washington University, St. Louis, MO.
1996-1997	Research Instructor in Radiology, Washington University, St. Louis, MO.
1998-2002	Assistant Professor of Radiology, Washington University, St. Louis, MO.
2003-present	Professor of Radiology, Washington University, St. Louis, MO.

**Reviewer experience:** •Magnetic Resonance in Medicine (editorial board) •Proceedings of the National Academy of Sciences •Nature, •Journal of Magnetic Resonance •Magnetic Resonance Imaging •Journal of Cerebral Blood Flow and Metabolism •Journal of Applied Physiology •European Journal of Applied Physiology •Biophysical Journal •Neuroimage •NMR in Biomedicine •Journal of Thermal Biology, Journal of the Neurological Sciences.

**Membership:** •International Society of Magnetic Resonance in Medicine •American Physical Society •Society for Neuroscience •The American Physiological Society •Organization for Human Brain Mapping

## **Honors:**

- 2014 Elected Fellow of the International Society of Magnetic Resonance in Medicine
- 2000-2002 Scholar Awardee of the Radiology Society of North America
- 1991-1992 Fellowship of the New York Academy of Scientists
- 1991 Ukrainian State Prize in the Field of Science and Technology (the highest level award for physics in Ukraine)
- 1981 Academic Degree of Doctor of Sciences in Physics and Mathematics awarded by the Higher Certifying Commission under the Council of Ministers of the USSR.
- 1985 Academic Title of Professor awarded by the Higher Certifying Commission under the Council of Ministers of the USSR.

## **C. 10 Publications (selected from more than 200 peer review papers)**

- Yablonskiy DA, Haacke EM. Theory of NMR signal behavior in magnetically inhomogeneous tissues: the static dephasing regime. *Magn Reson Med* 1994;32(6):749-763.
- Yablonskiy DA, Ackerman JJ, Raichle ME. Coupling between changes in human brain temperature and oxidative metabolism during prolonged visual stimulation. *Proc Natl Acad Sci USA* 2000;97(13):7603-7608.
- Yablonskiy DA, Sukstanskii AL, Leawoods JC, Gierada DS, Bretthorst GL, Lefrak SS, Cooper JD, Conradi MS. Quantitative in vivo assessment of lung microstructure at the alveolar level with hyperpolarized <sup>3</sup>He diffusion MRI. *Proc Natl Acad Sci U S A* 2002;99(5):3111-3116.
- Zhu M, Ackerman JJ, Sukstanskii AL, Yablonskiy DA. How the body controls brain temperature: the temperature shielding effect of cerebral blood flow. *J Appl Physiol* 2006;101(5):1481-1488.
- He X, Yablonskiy DA. Quantitative BOLD: mapping of human cerebral deoxygenated blood volume and oxygen extraction fraction: default state. *Magn Reson Med* 2007;57(1):115-126.
- He X, Yablonskiy DA. Biophysical mechanisms of phase contrast in gradient echo MRI. *Proc Natl Acad Sci U S A* 2009;106(32):13558-13563.
- Yablonskiy DA, Sukstanskii AL, Woods JC, Gierada DS, Quirk JD, Hogg JC, Cooper JD, Conradi MS. Quantification of lung microstructure with hyperpolarized <sup>3</sup>He diffusion MRI. *J Appl Physiol* 2009;107(4):1258-1265.
- Sati P, Cross AH, Luo J, Hildebolt CF, Yablonskiy DA. In vivo quantitative evaluation of brain tissue damage in multiple sclerosis using gradient echo plural contrast imaging. *Neuroimage* 2010;51(3):1089-1097.
- Luo J, Jagadeesan BD, Cross AH, Yablonskiy DA. Gradient Echo Plural Contrast Imaging - Signal model and derived contrasts: T2\*, T1, Phase, SWI, T1f, FST2\* and T2\*-SWI. *Neuroimage* 2012;60(2):1073-1082.
- Yablonskiy DA, Luo J, Sukstanskii AL, Iyer A, Cross AH. Biophysical mechanisms of MRI signal frequency contrast in multiple sclerosis. *Proc Natl Acad Sci U S A* 2012;109(35):14212-14217.

## **Additional recent publications of importance to the field**

- Yablonskiy DA, Sukstanskii AL. Theoretical models of the diffusion weighted MR signal. *NMR Biomed* 2010;23(7):661-681.
- Quirk JD, Lutey BA, Gierada DS, Woods JC, Senior RM, Lefrak SS, Sukstanskii AL, Conradi MS, Yablonskiy DA. In vivo detection of acinar microstructural changes in early emphysema with <sup>3</sup>He lung morphometry. *Radiology* 2011;260(3):866-874.
- Yablonskiy DA, Sukstanskii AL, He X. Blood oxygenation level-dependent (BOLD)-based techniques for the quantification of brain hemodynamic and metabolic properties - theoretical models and experimental approaches. *NMR Biomed* 2013;26(8):963-986.
- Yablonskiy DA, Sukstanskii AL, Luo J, Wang X. Voxel spread function method for correction of magnetic field inhomogeneity effects in quantitative gradient-echo MRI. *Magn Reson Med* 2013;70(5):1283-1292.
- Yablonskiy DA, Sukstanskii AL, Quirk JD, Woods JC, Conradi MS. Probing lung microstructure with hyperpolarized noble gas diffusion MRI: theoretical models and experimental results. *Magn Reson Med* 2013;71(2):486-505.
- Luo J, Yablonskiy DA, Hildebolt CF, Lancia S, Cross AH. Gradient echo magnetic resonance imaging correlates with clinical measures and allows visualization of veins within multiple sclerosis lesions. *Mult Scler* 2014;20(3):349-355.
- Wen J, Cross AH, Yablonskiy DA. On the role of physiological fluctuations in quantitative gradient echo MRI: implications for GEPCI, QSM, and SWI. *Magn Reson Med* 2014.
- Yablonskiy DA, He X, Luo J, Sukstanskii AL. Lorentz sphere versus generalized Lorentzian approach: What would Lorentz say about it? *Magn Reson Med* 2014;72(1):4-7.
- Yablonskiy DA, Sukstanskii AL. Biophysical mechanisms of myelin-induced water frequency shifts. *Magn Reson Med* 2014;71(6):1956-1958.